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(54) Title: ABSORBENT FIBROUS WEB CONTAINING CELLULOSE-CONTAINING RECYCLED MATERIAL

(57) Abstract

Any cellulose-containing recycled material can be utilized, but in particular paper and/or textiles. The recycled material is defibrated, and the cellulose-containing fibres are cleaned and mixed with fibres formed from at least one thermoplastic to give a homogeneous pulp, which is formatted and subjected to a heat treatment to bond together the fibres at many points, producing a compact layer of cellulose-containing recycled fibres and plastics fibres which exhibits networklike interbonding and increased yet elastic shape retention. The process is employed for manufacturing shaped absorbent cores by contacting the formatted pulp with at least one hot surface. The web can be used as an absorbent core in sanitary articles and bed linings and for industrial and medical purposes.

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Absorbent fibrous web containing cellulose-  
containing recycled material

The present invention relates to a process for producing an absorbent fibrous web containing a cellulose-containing recycled material, in particular paper and/or textiles. The invention further relates to the use of the process for producing shaped absorbent pads and to the use of the web as an absorbent core.

It is known to produce liquid-absorbing pads or mats by mechanical defibration of a cellulose pulp in a dry process, and then converting the defibrated material into the desired pad or mat form.

In a particular process described in EP-B1-0 202 237, wetting-resistant or coated waste material is used as cellulose-containing starting material. If necessary, it is cut to a suitable size for defibration. During or immediately prior to defibration, a mixture of water and a surfactant is added to the paper waste in order to restore the absorptive capacity of the cellulose fibres. Here the amount of mixture is up to 25 % by volume, based on the volume of the wastepaper.

Although the absorptive capacity of the cellulose fibres is restored with the mixture of water and a surfactant, pads or mats produced by the process of the above-cited European Patent neither exhibit the customary level of wear comfort nor are of the necessary quality for a competitive product.

It is an object of the present invention to provide a process of the type mentioned at the beginning whereby it is possible, despite the use of inexpensive starting materials, to produce in an economical manner high-quality webs which are also suitable for manufacturing shaped absorbent cores of high wear comfort.

This object is achieved according to the present invention by a process which is characterized in that the recycled material is defibrated, and the cellulose-containing recycled fibres are cleaned and mixed with fibres formed from at least one thermoplastic

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5 to give a homogeneous pulp, which is formatted and subjected to a heat treatment to bond together the fibres at many points, producing a compact layer of cellulose-containing recycled fibres and plastics fibres which exhibits networklike interbonding and increased yet elastic shape retention.

10 The defibration of recycled material, in particular paper and/or textiles, is effected in a conventional manner and corresponds in principle to the defibration of round timber chips in a defibrator. If necessary, the recycled material must be trimmed before defibration at least to the maximum size suitable for the machine. It is possible to use any cellulose-containing material obtained after use and/or 15 before processing.

20 The cellulose-containing recycled fibres obtained from the recycled material are cleaned in a conventional manner using at least one physical and/or chemical process. In the course of this process, any reduced absorptivity of the cellulose-containing recycled fibres is substantially restored.

25 The cellulose-containing recycled fibres and the plastics fibres are intimately mixed, preferably in a ratio of from 30:1 to 4:1, to form a homogeneous fibre blend.

30 Before mixing into the cellulose-containing recycled fibres, the plastics fibres are advantageously treated with a wetting agent. This surface-active agent reduces the surface tension of water, thereby facilitating the penetration of body fluid to the web and accelerating the spreading of the fluid on the surface of the plastic fibres. The wetting agents to be used are known to the person skilled in the art. A specific example of a wetting agent is Triton X-100 from 35 DUPONT.

The plastics fibres used preferably consist of a polyolefin or of a polyester. Examples of materials of plastics fibres are polyethylene polypropylene, copolymers of ethylene and propylene and also copolymers

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of propylene and butylene.

The plastics fibres mixed with the cellulose-containing recycled fibres generally have a diameter of 1 - 40  $\mu\text{m}$ , in particular 5 - 20  $\mu\text{m}$ .

5 It has proved to be particularly advantageous to mix cellulose-containing fibres with fibrillated polyethylene. A product from DUPONT known as "PULPLUS" and another product, "PULPEX" from Hercules, consist for example of fine, 1 - 20  $\mu\text{m}$  thick fibrils which form 10 numerous bonds in the course of the heat treatment through thermobonding. In addition to the very small diameter, these plastics fibres have inter alia the following advantageous properties:

- high strength and orientation
- 15 - ready meltability
- ready processibility
- high specific surface area
- chemical inertness
- environmental safeness
- 20 - inexpensiveness.

Absorbent pads produced from the fibre blend by thermobonding have the following advantageous properties:

- greater retention capacity for liquids
- 25 - improved retention capacity for pulverulent superabsorbers
- increased shape retention with retained elasticity
- higher strength before and after wetting
- great reduction in specific gravity.

30 The heat treatment, for example in a hot air stream, to bond the fibres together by local fusion is preferably effected at a temperature just below the combustion temperature of cellulose, in particular at 200-220°C. For both the process and the apparatus 35 reference is made to the applicant's Swiss Patent 675829. ~~Swiss Patent request No. 3930/00~~.

The cellulose-containing recycled fibres are advantageously mixed not only with plastics fibres but also with a chemical absorbent, in particular with a

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superabsorber. Alternatively, the absorbent, in particular superabsorber, can also be homogeneously dispersed in the web after the heat treatment.

5 Superabsorbers are highly absorbent polymers which can bind a multiple of their weight in salt-containing water or urine and in so doing form a gel which remains stable even under the action of pressure. This retention is a particularly important property for nappies, linings, sanitary towels, tampons  
10 and the like. The rate of absorption of a superabsorber depends in the main on its particle size; that is, smaller particles have a larger total superabsorber surface area and therefore absorption or gel formation take place significantly faster. The absorbency of an  
15 absorbent layer is set using different superabsorbers and/or different amounts of superabsorbers.

The superabsorbers used are for example the following products:

20 Aridall 1125 from Chemdal, U.S.A.  
Drytech 510 from Dow Chemical, U.S.A.  
PR 9910 S from Floerger, U.S.A.  
FAVOR 922 SK from Stockhausen, FRG

25 If an absorbent contains thermoplastics fibres, for example fibrillated polyethylene (cf. for example US-A1-4458042), the separate addition of plastics fibres can be dispensed with. The plastics fibres present in the absorbent are capable of effecting adequate consolidation of the web in the course of the heat treatment.

30 The use of the process according to the present invention is the manufacture of shaped absorbent cores by contacting the ready-produced mixed pulp with at least one hot surface. This hot surface can take the form for example of a hot bed, a hot roll or a moving, 35 endless hot belt.

According to the present invention, the web produced by the process is used as an absorbent core in nappies and disposable nappies for small children and adult patients, incontinence linings, sanitary towels,

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panty-linings, bed linings and disposable absorbent compresses. However, the web can also be used in general for medical and industrial purposes, in particular for protection pads against the action of water and for  
5 absorbing existing water.

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Claims

1. A process for producing an absorbent fibrous web containing a cellulose-containing recycled material, in particular paper and/or textiles,

characterized in that

the recycled material is defibrated, and the cellulose-containing recycled fibres are cleaned and mixed with fibres formed from at least one thermoplastic to give a homogeneous pulp, which is formatted and subjected to a heat treatment to bond together the fibres at many points, producing a compact layer of cellulose-containing recycled fibres and plastics fibres which exhibits networklike interbonding and increased yet elastic shape retention.

2. A process according to Claim 1, characterized in that the cellulose-containing recycled fibres and plastics fibres are mixed in a ratio of 30:1 to 4:1.

3. A process according to Claim 1 or 2, characterized in that the plastics fibres are treated with a wetting agent before mixing.

4. A process according to any one of Claims 1 - 3, characterized in that the cellulose-containing recycled fibres are mixed with fibres formed from a polyolefin or from a polyester.

5. A process according to any one of Claims 1 - 4, characterized in that the cellulose-containing recycled fibres are mixed with plastics fibres having a diameter within the range 1 - 40  $\mu\text{m}$ , preferably 5 - 20  $\mu\text{m}$ .

6. A process according to any one of Claims 1 - 5, characterized in that the cellulose-containing recycled fibres are mixed with fibrillated polyethylene.

7. A process according to any one of Claims 1 - 6, characterized in that the heat treatment is carried out at just below the combustion temperature of cellulose, preferably at 200 - 220°C.

8. A process according to any one of Claims 1 - 5, characterized in that the cellulose-containing recycled fibres are mixed with plastics fibres and a chemical absorbent, preferably a superabsorber, or a chemical

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absorbent, preferably a superabsorber, is homogeneously dispersed in the web after the heat treatment.

9. The use of the process according to any one of Claims 1 - 8, for manufacturing shaped absorbent cores by contacting the formatted pulp with at least one hot surface.

10. The use of the fibrous web produced according to any one of Claims 1 - 8 as an absorbent core in nappies and disposable nappies for small children and adult patients, incontinence linings, sanitary towels, panty-linings and bed linings and for industrial and medical purposes, such as disposable absorbent compresses.

## INTERNATIONAL SEARCH REPORT

PCT/EP 90/01151

International Application No.

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)<sup>6</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC.

Int.C1. 5 D04H1/42 ; D04H1/54

## II. FIELDS SEARCHED

Minimum Documentation Searched<sup>7</sup>

| Classification System | Classification Symbols |
|-----------------------|------------------------|
| Int.C1. 5             | D04H ; D21B            |

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>

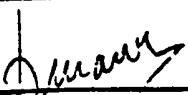
| Category <sup>10</sup> | Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup> | Relevant to Claim No. <sup>13</sup> |
|------------------------|--|-------------------------------------|
| A                      | WO,A,8602116 (DALKIAER) 10 April 1986<br>see page 1-3; claims 1, 2<br>(cited in the application)<br>---        | 1                                   |
| A                      | EP,A,227914 (PAUL HARTMANN) 08 July 1987<br>see the whole document<br>---                                      | 1, 5-6,<br>8-10                     |
| A                      | EP,A,53345 (HOECHST) 09 June 1982<br>see page 2-4; claims 1-4<br>---   | 4                                   |

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## IV. CERTIFICATION

|  |  |
|--|--|
| Date of the Actual Completion of the International Search<br><br>05 OCTOBER 1990 | Date of Mailing of this International Search Report<br><br>23. 10. 90  |
| International Searching Authority<br><br>EUROPEAN PATENT OFFICE                  | Signature of Authorized Officer<br><br>DURAND F.C.  |

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

EP 9001151  
SA 38946

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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